

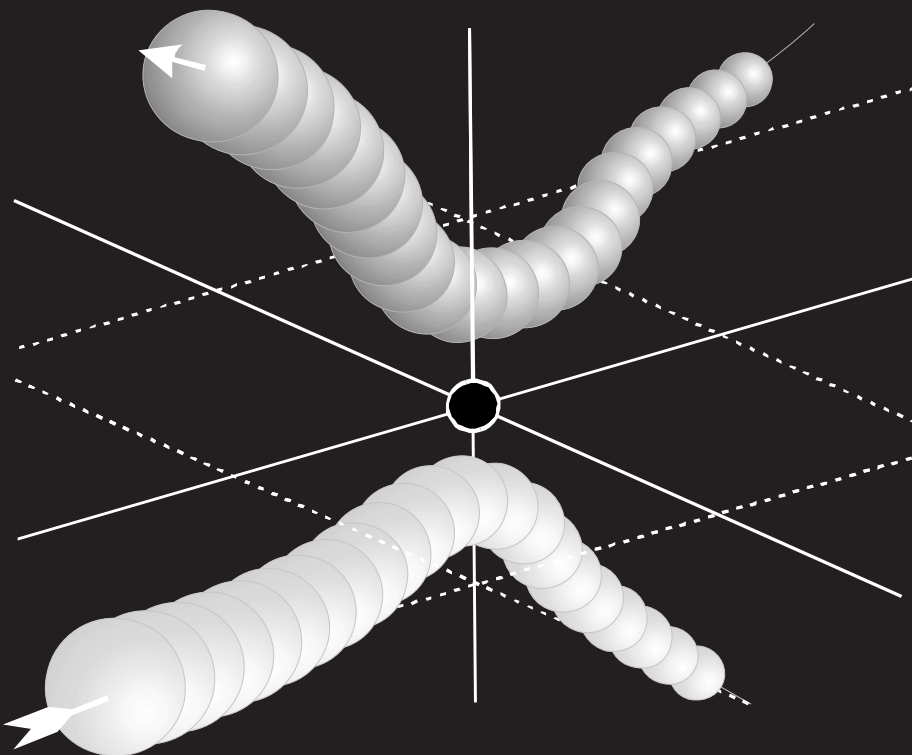
# Journal of Research



of the

# National Institute of Standards and Technology

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$$\left( \frac{d^2}{dr^2} + k^2 - \frac{\ell(\ell+1)}{r^2} - \frac{2\mu}{\hbar} \varphi(r) \right) \psi_\ell(r) = 0$$

**NIST**

National Institute of Standards and Technology

Technology Administration, U.S. Department of Commerce

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- Materials Reliability<sup>1</sup>
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<sup>1</sup> At Boulder, CO 80303.

<sup>2</sup> Some elements at Boulder, CO.

# *Journal of Research of the* **National Institute of Standards and Technology**

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**Cover:** The cover illustration represents a collision between two classical particles interacting with the potential energy function  $\varphi_{\text{He}}(r)$ . This collision models the quantum-mechanical scattering of pairs of helium atoms that determine the thermophysical properties of gaseous helium. Hurly and Moldover calculated and tabulated these properties from 1 K to 10 000 K (see article on p. 667). The uncertainties of their results are smaller than the uncertainties of the best measurements; thus, they recommend that the calculated values be used as standards to calibrate instruments for measuring the viscosity, thermal conductivity, virial coefficients, etc. Their calculations numerically solved the partial wave equation (also on the cover) for all possible scattering events. The thermophysical properties were computed from appropriately weighted sums of these solutions. Cover illustration by C. Carey.

The *Journal of Research of the National Institute of Standards and Technology*, the flagship periodic publication of the national metrology institute of the United States, features advances in metrology and related fields of physical science, engineering, applied mathematics, statistics, and information technology that reflect the scientific and technical programs of the Institute. The *Journal* publishes papers on instrumentation for making accurate measurements, mathematical models of physical phenomena, including computational models, critical data, calibration techniques, well-characterized reference materials, and quality assurance programs that report the results of current NIST work in these areas. Occasionally, a Special Issue of the *Journal* is devoted to papers on a single topic. Also appearing on occasion are review articles and reports on conferences and workshops sponsored in whole or in part by NIST.

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